STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Case No. 19-0397-PET

Investigation to update screening values for use by the Energy Efficiency Utilities when they perform cost-effectiveness screening of energy efficiency measures	

Order entered: 07/06/2020

ORDER ON THE EEU SCREENING VALUES FOR USE STARTING IN 2021

In today's Order, the Vermont Public Utility Commission ("Commission") adopts, with clarifications, the conclusions and recommendations made in the Hearing Officer's proposal for decision.

The proposal for decision was circulated for comment. Comments were filed by several participants in this proceeding. The participants' comments and our determinations are addressed in the Commission discussion and conclusions section below.

PROPOSAL FOR DECISION

I. INTRODUCTION

In this proposal for decision, I recommend that the Commission approve updated avoided costs, externality adjustments, and other screening components for use by the Energy Efficiency Utilities ("EEUs") when they perform cost-effectiveness screening of energy efficiency measures.[1] I recommend that the newly established values be implemented by the EEUs for the 2020-2021 time period.

II. BACKGROUND AND PROCEDURAL HISTORY

Section V.14 of the document titled Process and Administration of an Energy Efficiency Utility Order of Appointment calls on the Vermont Department of Public Service ("Department") to biennially propose updated values for use by the EEUs when they perform

[1] The Commission has appointed the City of Burlington Electric Department ("BED") to provide EEU services within its service territory and Vermont Energy Investment Corporation to provide EEU services in the rest of the state (known as "Efficiency Vermont"). The Commission has appointed Vermont Gas Systems, Inc. ("VGS") to provide natural gas EEU services within its service territory.

cost-effectiveness screening of energy efficiency measures.[2] Such values include avoided costs of energy and capacity, environmental externality adjustments, and other screening components.

In an order issued on October 20, 2017, the Commission approved avoided costs, externality adjustments, and other screening components that are under review in this proceeding.[3] EEUs continue to use these values when they perform cost-effectiveness screening of energy efficiency measures until updated values are determined in this proceeding.

On February 5, 2019, the Department filed a petition with the Commission requesting that a proceeding be opened to update the values for use by the EEUs when they perform cost-effectiveness screening of energy efficiency measures.

On February 21, 2019, a prehearing conference was held in this proceeding. At the prehearing conference, participants agreed that the proceeding should not be conducted as a contested case, but that the schedule would include the filing of testimony and an evidentiary hearing. Because this process is not a contested case, there are no parties.

In a February 26, 2019, Scheduling Order, it was determined that this proceeding would be conducted in two tracks.[4] The first track addresses the following screening values: avoided energy and capacity costs; avoided natural gas costs; avoided costs of petroleum and other fuels; avoided externality costs; demand reduction induced price effect values; transmission and distribution component of avoided costs; distribution line loss values; discount rate; and a risk adjustment. The second track will address the following screening values: a non-energy benefits adjustment and a low-income adjustment.

On April 4, 2019, a workshop was held. The workshop included a discussion of the 2018 study, *Avoided Energy Supply Costs in New England* ("AESC study").[5]

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[2] The Process and Administration of an Energy Efficiency Order of Appointment Document (the "Process and Administration Document") describes the overall EEU program structure under the Order of Appointment model. The current version of the document was approved by the Commission on November 26, 2019, in Case No. 18-2867-INV.

[3] *Order Re: EEU Avoided Costs, Externality Adjustments, and Other Screening Components for 2017-2018 Time Period*, Case No. EEU-2015-04, Order of 10/20/2017.

[4] *Prehearing Conference Memorandum, Scheduling Order, and Notice of Workshop*, Case No. 19-0397-PET, Order of 2/26/2019.

[5] *Avoided Energy Supply Costs in New England: 2018 Report*, Synapse Energy Economics, Inc., October 24, 2018. Available at: http://www.synapse-energy.com/project/aesc-2018-materials.

On September 19, 2019, an evidentiary hearing was held. The testimony and exhibits of witnesses for the Department, Efficiency Vermont, and Conservation Law Foundation ("CLF") were admitted into the record.

On October 10, 2019, the Department, Efficiency Vermont, and CLF separately filed briefs.

On October 22, 2019, CLF filed a reply brief.

On October 24, 2019, the Department and Efficiency Vermont separately filed reply briefs.

III. SUMMARY OF PARTICIPANTS' POSITIONS

The AESC study serves as a basis for the participants' recommendations for avoided costs for energy and capacity, natural gas, and other fuels; environmental externality adjustment values for energy, natural gas, and fuel oil; and demand induced price effect ("DRIPE") values. The participants made recommendations on other screening components that include: a risk adjustment value; a wholesale risk premium value; avoided costs of transmission and distribution; distribution line loss values; and a discount rate.

The Department, Efficiency Vermont, and CLF agree upon the screening values for the avoided costs for energy and capacity, natural gas, and other fuels; wholesale risk premium; distribution line loss; and discount rate. The participants do not agree on the remaining screening components. In addition, Efficiency Vermont recommended that the Commission adopt two new screening components: avoided cost values for winter capacity and hourly avoided cost values for energy.

IV. FINDINGS AND DISCUSSION

Pursuant to 30 V.S.A. § 8(c), and based on the record and evidence before me, I present the following proposed findings of fact to the Commission. My findings and recommendations are addressed by topic area.

A. Cost-Effectiveness Screening

1. The societal cost-effectiveness test is currently used by the EEUs to make decisions regarding which energy efficiency programs and measures to implement. Riley Allen, Vermont

Department of Public Service ("Allen") pf. at 2-3; Gillian Eaton, Efficiency Vermont ("Eaton") pf. at 3-4; exh. DPS-BC-1-Revised at 1.

2. The societal cost test is used to assess whether the benefits of energy efficiency will exceed its costs from the perspective of society as a whole. The cost side of the test assesses the incremental cost of the measure or project – the cost differential between a baseline measure and the more efficient measure. The benefit side of the test assesses the avoided costs of a measure – that is, the incremental costs society avoids by implementing an energy efficiency measure. Allen pf. at 2-3; Eaton pf. at 4-5.

3. Benefits under the societal cost test include resource impacts associated with the reduction in the use of electricity, fuel, and water. Benefits also include benefits related to externalities such as non-energy benefits and the reduction of environmental externalities (e.g., the avoidance or minimization of air and water pollution and greenhouse gas emissions). Allen pf. at 2-3; Eaton pf. at 4-5.

4. The societal cost test compares the societal benefits and the societal costs associated with an energy efficiency measure over its lifetime. If an energy efficiency measure's benefits are greater than its costs, it can be said to be "societally" cost-effective. Eaton pf. at 4-5.

5. The Department has developed cost-effectiveness screening tools that employ the use of the societal cost test. The EEUs have been required by the Commission to use these tools since the EEU program's inception. Allen pf. at 2-3; Eaton pf. at 4-5.

6. Section V.14 of the document titled Process and Administration of an Energy Efficiency Utility Order of Appointment calls on the Department to biennially propose for Commission approval updates to avoided costs, externality adjustments, and other screening components for use by the EEUs. The cost-effectiveness screening tools are modified to reflect these updated values. Brian Cotterill, Vermont Department of Public Service ("Cotterill") pf. at 3-4.

Discussion

In past proceedings, the Commission has established a methodology for the cost-effectiveness screening of electric and thermal-energy-and-process-fuel efficiency measures.[6]

[6] *See Order Re: EEU Avoided Costs, Externality Adjustments, and Other Screening Components for 2017-2018 Time Period*, Case No. EEU-2015-04, Order of 10/20/2017.

The Commission has long required energy efficiency providers over which it has jurisdiction to make decisions regarding which energy efficiency programs and measures to implement based on the societal cost-effectiveness test.[7] An EEU may only implement energy efficiency measures and projects that are determined to be societally cost-effective (meaning that the benefits exceed the costs). The Department developed cost-effectiveness screening tools based on the societal cost test and the Commission's decisions with respect to the avoided costs, externality adjustments, and other screening components. The Commission has required EEUs to use these screening tools since the EEU program's inception.

The Department and Efficiency Vermont recommend the continued use of the societal cost-effectiveness test for screening efficiency measures. The Department and Efficiency Vermont also recommend the continued use of the cost-effectiveness screening tools updated with the avoided costs, externality adjustments, and other screening components approved in this proceeding. I recommend the continued use of the societal cost-effectiveness test and cost-effectiveness screening tools.

B. Avoided Costs for Energy and Capacity

7. When an energy efficiency measure is implemented, the demand for energy, also referred to as load, decreases. As a result, the distribution utility has less energy and capacity needs, and therefore lower costs. The avoided costs of energy and capacity represent the costs associated with those products that the utility avoids as a direct result of the energy efficiency measure. Maria Fischer, Vermont Department of Public Service ("Fischer") pf. at 3.

8. The 2018 AESC study and resulting report are part of a regular effort conducted by representatives of each New England state. The purpose of the study is to develop a common set of avoided costs and other screening values for the New England states to use in assessing the cost-effectiveness of efficiency measures and programs. The AESC study includes avoided costs for wholesale electric energy and capacity. Cotterill 5-6; David Westman, Efficiency Vermont ("Westman") pf. at 4-5; exh. DPS-BC-1-Revised at 1; exh. EVT-DW-1.

9. The AESC study employs a market simulation that is intended to estimate avoided costs in the absence of any future regional energy efficiency programs (referred to as the

[7] *See* Docket 5270, Orders of 4/16/90 and 6/6/90; Docket 5980, Order of 9/30/99 at 58.

"counterfactual" model). The model assumes no new energy efficiency measures are installed in 2018 or later years. Westman pf. at 6; exh. EVT-DW-1.

10. The AESC study is specifically designed to be flexible so individual states can make changes specific to their jurisdiction. The methodology used to calculate avoided costs includes certain assumptions regarding the wholesale risk premium, transmission losses, distribution line losses, the discount rate, and the percentage of capacity bid into the ISO New England Forward Capacity Market. The electronic workbook for the AESC study is designed such that one or more of these assumptions can be changed and the year-by-year avoided cost values will automatically be recalculated. Cotterill 5-6; Westman pf. at 4-6; exh. EVT-DW-1; exh. PSD-BC-1-Revised at 1-5; exh. EVT-EB-1-Revised.

11. Under the Vermont Renewable Energy Standard ("RES"), Vermont distribution utilities are required to own sufficient energy produced by renewable energy plants or sufficient tradeable renewable energy credits from plants whose energy is capable of delivery in New England that reflect the required amounts of renewable energy that is specified in 30 V.S.A. § 8005(a)(1(B) ("Tier 1" requirements) and § 8005(a)(2)(C) ("Tier 2" requirements). Tier 1 requires a distribution utility to obtain 55% of annual retail electric sales from renewable energy beginning on January 1, 2017, increasing by an additional 4% each third year, until reaching 75% on and after January 1, 2032. Tier 2 requires that a distribution utility obtain 1% of annual retail electric sales from new distributed renewable generation beginning on January 1, 2017, increasing by an additional three-fifths of a percent each year, until reaching 10% on and after January 1, 2023. Allen pf. at 4; Fischer pf. at 6; exh. DPS-BC-1-Revised at 12.

12. The avoided cost values for energy calculated in the AESC study include the avoided RES compliance costs (both Tier 1 and Tier 2 requirements). The RES compliance costs that retail customers avoid through the reductions in their energy usage are equal to the price of renewable energy credits multiplied by the load obligated to be served with renewable generation (i.e., the RES target percentage). On a 15-year levelized basis, the AESC study estimates avoided RES compliance costs for Vermont to be $2.00 per MWh. Exh. DPS-BC-1-Revised at 7-8; exh. EVT-DW-1.

13. Compared to previous AESC studies, on a 15-year levelized basis, the AESC study estimates lower avoided costs of energy for the region, primarily driven by a forecast of sustained low natural gas prices. Exh. PSD-BC-1-Revised at 1-2; exh. EVT-DW-1.

14. On a 15-year levelized basis, the AESC study estimates energy avoided costs for Vermont to be $0.042 per kWh for summer off-peak, $0.048 per kWh for summer peak, $0.060 per kWh for winter off-peak, and $0.064 per kWh for winter peak and estimates capacity avoided costs to be $83.1 per kW-yr. These estimated avoided cost values assume: 100 percent of available capacity from efficiency measures is bid into the Forward Capacity Market (consistent with Efficiency Vermont's activity in recent capacity auctions); wholesale risk premium of 4% in winter and 0% in summer; discount rate of 3%; distribution line loss default value of 8% for energy and capacity; and pooled transmission facilities line losses of 1.6% for capacity. Fischer pf. at 9-10; exh. DPS-BC-1-Revised at 3-5; exh. EVT-EB-1-Revised; exh. EVT-DW-1.

Discussion

I recommend that the Commission adopt the avoided costs for energy and capacity proposed by the Department. Efficiency Vermont and CLF agree with the Department's recommendations. The Department proposes the adoption of the avoided costs for energy and capacity determined in the AESC study. The AESC study employs a market simulation that is intended to estimate avoided costs in the absence of any future regional energy efficiency programs. While this counterfactual scenario is not likely to occur, it is a more appropriate method for determining the avoided costs from efficiency investments than future prices that include assumed effects of future efficiency investments.

The methodology used to calculate the proposed avoided costs includes certain assumptions regarding the wholesale risk premium, transmission losses, distribution line losses, the discount rate, and the percentage of capacity bid into the Forward Capacity Market. Consistent with Efficiency Vermont's activity in recent capacity auctions, the methodology used to determine capacity avoided costs assumes that 100 percent of available capacity from efficiency measures is bid into the Forward Capacity Market. Consistent with the past

determinations, the proposed avoided costs assume a discount rate of 3% and pooled transmission facilities line losses of 1.6% for capacity.

Comparing to past avoided cost determinations, the Department proposes two changes to the assumptions used to calculate the avoided costs for energy and capacity. First, the Department proposes that the assumptions include a wholesale risk premium of 4% in winter and 0% in summer, while past determinations have set this value at 0% for both time periods. Second, the Department proposes that the assumptions include a distribution line loss default value of 8% for energy and capacity. In past avoided cost determinations, the line loss value was set to 0% when calculating avoided costs for energy and 8% when calculating avoided costs for capacity. The recommendations with respect to these assumptions are discussed in more detail in Sections G and I, below.

These changes to the assumptions have been incorporated into the avoided costs for energy and capacity recommended by the Department. I am recommending that the Commission adopt the changes to the assumptions and the corresponding avoided costs for energy and capacity. The Attachment to this proposal for decision contains the avoided costs that I am recommending the Commission approve.

It is important to recognize that Vermont distribution utilities, when planning for future power supplies, may rely on avoided power costs that differ from those contained in the AESC study and from those I am recommending the Commission approve for use by the EEUs. The difference in costs is due to the AESC study employing a market simulation that is intended to estimate the cost of power in the absence of any future energy efficiency programs. It is appropriate to use avoided-cost values for energy efficiency decisions that differ from those used for electric power resource-acquisition decisions.[8]

C. Time-Based Energy Avoided Costs and Winter Capacity Avoided Costs

15. The AESC study includes estimates of hourly avoided costs for energy that allow the assessment of energy efficiency measures outside of the avoided cost periods of summer off-peak, summer on-peak, winter on-peak, and winter off-peak. These hourly estimates were not

[8] Pursuant to 30 V.S.A. § 218c, least-cost integrated planning includes the consideration of energy efficiency resources and supply-side resources.

included in past AESC studies. Westman pf. at 19-20; exh. DPS-BC-1-Revised at 6; exh. EVT-DW-1.

16. The AESC study estimates avoided costs of capacity. The avoided costs are not specified as either summer or winter value. Cotterill pf. at 5-6; exh. DPS-BC-1 at 8; exh. EVT-DW-1.

17. The Forward Capacity Market ensures that the New England power system will have sufficient resources to meet the future demand for electricity. ISO New England determines the amount of resources needed and conducts a forward capacity auction three years in advance of the operating period. Resources, including energy efficiency, participate in the auction to obtain a capacity supply obligation in exchange for a capacity payment at the time of delivery. A resource can obtain a capacity supply obligation for the quantity of capacity up to its qualified capacity for the commitment period. Fischer reb. pf. at 3.

18. Prior to the forward capacity auction, each resource receives a summer and winter seasonal qualified capacity rating. The qualified capacity rating is determined by the capacity delivered by the resources during the single peak hour for the period. A resource can offer the lesser of its winter and summer rating into the capacity auction to obtain a capacity supply obligation. Fischer reb. pf. at 4-5.

19. For energy efficiency resources, winter has historically received a greater capacity rating than summer. Because a resource must offer the lesser of its winter and summer rating into the capacity auction, the quantity of cleared efficiency in the forward capacity auction has typically been limited to the summer qualified capacity rating. Fischer reb. pf. at 4.

20. Payment for a capacity resource is based on the capacity supply obligation and the capacity auction clearing price. For example, if the auction clears at a price of $4.00 per kW-month and a resource clears 100 MW of its qualified capacity it will receive payments of $400,000 each month (100 MW x $4.00 per kW-month). This payment is paid by load suppliers (e.g. distribution utilities) that are obligated to purchase capacity equal to their load at the forward capacity auction clearing price. Fischer reb. pf. at 4-5.

21. The quantity of cleared energy efficiency in the forward capacity auction effectively reduces the amount of capacity required to be purchased by distribution utilities. This cleared

capacity equals the purchases that the distribution utilities avoid, and the forward capacity auction clearing price represents the avoided costs of those purchases. Fischer reb. pf. at 4-5.

22. Efficiency Vermont bids summer and winter peak savings into the annual and monthly reconfiguration capacity auctions and receives revenue based on both the summer and winter coincident peak reduction attributable to Efficiency Vermont's program activities. Erik Brown, Efficiency Vermont ("Brown") pf. at 7.

23. While Efficiency Vermont receives revenues for winter peak savings in reconfiguration auctions, these revenues do not represent costs avoided by Vermont's distribution utilities. Distribution utilities are obligated to purchase capacity equal to their load at the forward capacity auction clearing price and the reconfiguration auctions do not change that price. Fischer reb. pf. at 4-5.

Discussion

Efficiency Vermont recommends that the Commission adopt the hourly avoided costs for energy contained in the AESC study. Efficiency Vermont states that hourly avoided costs would not be used in all efficiency screening and would be employed to assess active measures and demand management. Efficiency Vermont notes that the adoption of the hourly avoided energy costs would serve as an important initial step, but additional process is needed to incorporate their use in the state screening tools.

The Department argues that hourly avoided costs are not needed at this time because Efficiency Vermont is currently not the provider of active efficiency measures or provides a primary role in demand management activities. The Department supports additional process to consider how hourly avoided costs may be used in the future.

I recommend that the Commission not adopt hourly avoided costs. Efficiency Vermont has not demonstrated that it is currently implementing efficiency measures that require the use of hourly avoided costs. The Department and Efficiency Vermont are encouraged to conduct additional process to consider how hourly avoided costs may be used in the future. I further recommend that the consideration of hourly avoided cost be reviewed in the next avoided cost update proceeding.

Efficiency Vermont recommends that the Commission adopt avoided costs for winter capacity for the screening of energy efficiency measures. To approximate the value of winter

capacity, Efficiency Vermont proposes that the avoided costs for capacity contained in the AESC study be split to apply 2/3 (8 months) of the value to summer kW reductions, and 1/3 (4 months) to winter kW reductions. Efficiency Vermont maintains that this treatment more accurately reflects the relative contributions of the summer and winter kW reductions to the overall avoided capacity reductions. Efficiency Vermont argues that winter capacity costs would allow for a better assessment of the impacts of efficiency measures and programs on the winter peak.

The Department maintains that the AESC study's avoided costs for capacity should be used unadjusted in the state screening tools. The Department argues that assigning a separate winter capacity value would be inconsistent with the operation of the Forward Capacity Market and does not accurately quantify the value of avoided capacity costs from efficiency measures.

I recommend that the Commission not adopt avoided costs for winter capacity. Currently, Efficiency Vermont bids into the forward capacity auction based on a qualified capacity rating that is determined during the single peak hour for the summer period. The quantity of cleared energy efficiency in the forward capacity auction effectively reduces the amount of capacity required to be purchased by distribution utilities. This cleared capacity equals the purchases that the distribution utilities avoid and the forward capacity auction clearing price represents the avoided costs of those purchases. While Efficiency Vermont receives revenues for winter peak savings in reconfiguration auctions, these revenues do not represent costs avoided by Vermont's distribution utilities. Monthly and annual reconfiguration auctions provide a mechanism for capacity resources to acquire, increase, or shed all or part of their capacity supply obligations for a capacity commitment period. Distribution utilities are obligated to purchase capacity equal to their load at the forward capacity auction clearing price, and the reconfiguration auctions do not change that price. Therefore, there is no need to adjust the avoided costs for capacity to reflect a winter period value when screening energy efficiency investments.

D. Avoided Costs for Natural Gas, Petroleum Products, and Other Fuels

24. Avoided costs are estimates of marginal energy supply costs that can be avoided in future years due to reductions in the use of natural gas, fossil fuels, and other fuels as the result of energy efficiency investments. Cotterill pf. at 3.

25. The AESC study includes avoided costs for natural gas, fossil fuels, and other fuels. Cotterill at 7-8; exh. DPS-BC-1-Revised at 8-10; exh. EVT-DW-1.

26. The avoided cost of natural gas at a retail customer's meter typically has two components: (1) the avoided cost of gas delivered to the local distribution company (the "citygate cost"); and (2) the avoided cost of delivering gas on the distribution system (the "retail margin"). Vermont avoided costs for natural gas do not include a retail margin because VGS serves as the singular state local distribution company and unlike other states is not connected to other New England transmission systems. Cotterill pf. at 10; exh. DPS-BC-1-Revised at 8-9.

27. Compared to previous AESC studies, the AESC study assumes that Henry Hub natural gas prices are lower over the long-term because of higher natural gas production driven in part by lower breakeven drilling and operating costs in major shale gas regions. Cotterill pf. at 10-11; exh. DPS-BC-1-Revised at 8-9; exh. EVT-DW-1.

28. Compared to previous AESC studies, the Vermont design-day avoided costs increased slightly due to greater upstream transmission costs. Peak-day costs are also higher because the variable operating costs for the propane-based peaking facility are included. The avoidable natural gas costs for the remainder of the year (remaining winter and shoulder/summer days) are lower because of lower projected natural gas prices at the Dawn Hub. Cotterill pf. at 10; exh. DPS-BC-1-Revised at 9; exh. EVT-DW-1.

29. On a 15-year levelized basis, the AESC study estimates natural gas avoided costs for Vermont to be $561.39 per MMBtu for design day, $26.27 per MMBtu for peak day, $4.89 per MMBtu for remaining winter days, and $4.48 per MMBtu for shoulder/summer days. Cotterill at 10-11; exh. DPS-BC-1-Revised at 8-10; exh. EVT-DW-1.

30. A peak-day storage avoided cost is used in the screening of natural gas energy efficiency measures. This avoided cost is not provided in the AESC study. An avoided cost of $186.2 per MCF is currently used for the screening of efficiency measures. Cotterill pf. at 11; exh. DPS-BC-1-Revised at 9; exh. DPS-BC-2-Revised.

31. The AESC study does not provide estimates for the avoided cost of compressed natural gas. In the current version of the state screening tools, the avoided costs of compressed natural gas are assumed to be 75% of the avoided costs of commercial fuel oil. Cotterill pf. at 11; exh. DPS-BC-1-Revised at 9.

32. Compared to previous AESC studies, the 15-year levelized avoided cost of retail petroleum and wood fuels is higher for the residential sector, generally lower for the commercial sector, and generally higher for the industrial sector. The increases are driven primarily by a change in methodology that uses New England fuel price survey data rather than Energy Information Agency data. Cotterill pf. at 11-12; exh. DPS-BC-1-Revised at 10; exh. EVT-DW-1.

33. On a 15-year levelized basis, the AESC study estimates fuel oil avoided costs for Vermont to be $22.17 per MMBtu for the residential sector, $18.40 per MMBtu (weighted average) for the commercial sector, and $18.86 per MMBtu (weighted average) for the industrial sector. Cotterill at 10-11; exh. DPS-BC-1-Revised at 9-10; exh. EVT-DW-1.

34. On a 15-year levelized basis, the AESC study estimates other fuel avoided costs for Vermont in the residential sector to be $13.40 per MMBtu for cord wood, $21.60 per MMBtu for wood pellets, $19.88 per MMBtu for kerosene, and $31.11 per MMBtu for propane. On a 15-year levelized basis, the AESC study estimates other fuel avoided costs for Vermont in the industrial sector to be $19.28 per MMBtu for kerosene. Cotterill at 10-11; exh. DPS-BC-1-Revised at 9-10; exh. EVT-DW-1.

Discussion

I recommend that the Commission adopt the avoided costs proposed by the Department for natural gas, petroleum products, and other fuels. Efficiency Vermont and CLF agree with the recommendations. The Department proposes the adoption of the avoided costs for natural gas determined in the AESC study that include values for design day, peak day, remaining winter days, and shoulder/summer days. The Department also proposes the adoption of the avoided costs for petroleum fuels and wood fuels determined in the AESC study. These avoided costs are estimates of marginal energy supply costs that can be avoided in future years due to reductions in the use of natural gas, fossil fuels, and other fuels as the result of energy efficiency investments.

The Department proposes no changes to the peak-day storage avoided cost value or the compressed natural gas avoided costs currently used in the screening of natural gas energy efficiency measures. The Department maintains that these current values continue to be

reasonable estimates of avoided costs. I recommend that the Commission adopt the Department's proposed values for avoided natural gas and compressed natural gas costs.

The Attachment to this proposal for decision contains the avoided costs for natural gas, petroleum products, and other fuels that I am recommending the Commission adopt.

E. Environmental Externality Adjustments

35. The AESC study includes annual and levelized environmental externality adjustment values for energy (winter peak, winter off-peak, summer peak, and summer off-peak), natural gas (residential, commercial, and industrial), and fuel oil (residential, commercial, and industrial). Cotterill pf. 5-6; exh. DPS-BC-1-Revised at 11-14; exh. EVT-DCW-1.

36. The externality adjustment values are based on the estimated marginal cost of carbon emissions abatement. The AESC study estimated this value to be $100 per ton of CO_2 (or $0.05 per pound ("lb")). The adjustment values for energy account for the portion of abatement costs embedded in avoided energy supply costs associated with the Regional Greenhouse Gas Initiative ("RGGI"). Cotterill pf. at 5-6; exh. DPS-BC-1-Revised at 11-12; exh. EVT-DCW-1.

37. For the energy externality adjustment values, the AESC study assumes that marginal emissions rates do not vary substantially across the study years and assumes the CO_2 emission rates of 0.978 lbs per kWh for winter peak, 0.999 lbs per kWh for winter off-peak, 0.952 lbs per kWh for summer peak, and 0.959 lbs per kWh for summer off-peak. These marginal emission rates are based on natural gas-fired or fuel oil-fired generation. Exh. DPS-BC-1-Revised at 11; exh. EVT-DCW-1 at 370.

38. The AESC study determines the energy externality adjustment values by multiplying the reduction in energy use achieved by energy efficiency programs by the marginal cost of carbon emissions abatement for the marginal unit (marginal cost of carbon multiplied by the CO_2 emission rate). Exh. DPS-BC-1-Revised at 11; exh. EVT-DCW-1 at 264.

39. On a 15-year levelized basis, the AESC study estimates energy externality adjustment values for Vermont to be $0.042 per kWh for winter peak, $0.043 per kWh for winter off-peak, $0.041 per kWh for summer peak, and $0.041 per kWh for summer off-peak. Cotterill at 10-11; exh. DPS-BC-1-Revised at 13-14; exh. EVT-EB-1-Revised; exh. EVT-DW-1.

40. On a 15-year levelized basis, the AESC study estimates natural gas externality adjustment values for Vermont to be $5.85 per MMBtu for the residential, commercial, and industrial sectors. Cotterill at 10-11; exh. DPS-BC-1-Revised at 13-14; exh. DPS-BC-2-Revised; exh. EVT-DW-1.

41. On a 15-year levelized basis, the AESC study estimates fuel oil externality adjustment values for Vermont to be $8.05 per MMBtu for the residential, commercial, and industrial sectors. Cotterill at 10-11; exh. DPS-BC-1-Revised at 13-14; exh. DPS-BC-2-Revised; exh. EVT-DW-1.

Discussion

I recommend that the Commission adopt the externality adjustment values for natural gas and fuel oil proposed by the Department. Efficiency Vermont and CLF agree with the recommendations. The Department proposes the adoption of the externality adjustment values for natural gas and fuel oil determined in the AESC study that include values for the residential, commercial, and industrial sectors. The externality adjustments were based on the estimated marginal cost of carbon emissions abatement of $100 per ton of CO_2.

Both Efficiency Vermont and CLF recommend that the Commission adopt externality adjustment values for energy determined in the AESC study. Efficiency Vermont argues that the AESC values are appropriate because they characterize the environmental externalities that will be avoided as marginal generators are displaced by efficiency. Efficiency Vermont contends that the AESC study measures the incremental resources available to serve load within the regional power pool and values avoided carbon externality based on such measurement. Efficiency Vermont maintains that the process for measuring externalities and carbon values currently employed by the EEUs is based on the approach described in the AESC study.

CLF argues that the externality adjustment should be based on the marginal emission rate because energy efficiency avoids marginal supply and the emissions produced by that marginal supply. CLF further argues that the renewable resources relied on to provide electricity in Vermont produce emissions or have other environmental impacts that are accounted for in the AESC study externality adjustment values.

The Department recommends that the Commission adopt externality adjustment values for energy determined in the AESC study multiplied by the percentage of future load that is not obligated to be served with renewable generation under the RES, starting at 45% in 2018 and declining to 25% in 2032 and beyond. The Department contends that further adjustments may be warranted for distribution utilities that maintain a portfolio commitment above the RES requirements, like those for Washington Electric Cooperative and BED. The Department contends that the externality adjustment values for energy should reflect the emissions characteristics of the resources displaced, which are now, and into the future, disproportionately renewable resources needed to meet Vermont's distribution utilities' portfolio obligations. The Department argues that the AESC study has inappropriately calculated externality adjustments by using short-term marginal emission rates of natural gas-fired units, and instead should use long-term marginal emission rates that reflect the implementation of renewable portfolio standards in the region. The Department maintains that its proposed adjustment to the AESC study values reflects the emissions characteristics of a mixture of new wind, solar, and natural gas generation resource characteristics displaced by energy efficiency.

I recommend that the Commission adopt the externality adjustment values for energy determined in the AESC study for use in efficiency screening. The AESC study determines the energy externality adjustment values by multiplying the reduction in energy use achieved by energy efficiency programs by the marginal cost of carbon emissions abatement for the marginal unit. This determination is consistent with the determination of the avoided cost values a distribution utility avoids as a direct result of the energy efficiency measures which are determined based on the cost of the marginal generator. It is appropriate to determine both the costs avoided and the externalities avoided based on the same unit, which is a natural-gas-fired unit during the AESC study period. That is, the cost side of the societal test should balance the benefit side.

Further, I recommend that the externality adjustment values for energy include no further adjustments. In past decisions, the externality adjustment values for energy contained in the AESC study were further modified to account for the RES Tier 2 requirements. The values were multiplied by the percentage of future load that is not obligated to be served with renewable

generation under Tier 2, starting at 99% in 2017 and declining to 90% in 2032.[9] Past decisions recognized that future updates of the AESC study would reflect the RES requirements and any associated reductions in externality values. The AESC study now includes the assumption that the RES requirements will be met over the study time period. Thus, the reduction in energy use achieved by energy efficiency programs determined in the study and used in calculating the eternality adjustment values reflects the RES requirements and requires no further adjustments.

The Attachment to this proposal for decision contains the environmental externality adjustments for energy, natural gas, fuel oil, and other fuels that I am recommending the Commission approve.

F. DRIPE

42. The demand reduction induced price effect ("DRIPE") is a measure of the impact of reduced electricity consumption due to energy efficiency investments on regional energy and capacity market clearing prices. Allen pf. at 16; exh. DPS-BC-1-Revised at 14-15.

43. Energy efficiency measures result in the demand curve shifting down, creating a new equilibrium with the supply curve at a lower price. This lower price reduces the overall costs for retail suppliers that can then be passed on to retail customers through lower rates. However, at the same time, electric generators and other resources are negatively affected with reduced revenues as a result of these lower prices. The value attributed to DRIPE includes the volume of energy that is affected across the entire market. Exh. PSD-BC-1-Revised at 14.

44. The AESC study includes an analysis of DRIPE. The AESC study estimates DRIPE benefits induced by reduced demand on electricity (energy and capacity), natural gas (supply and transportation), and oil markets. DRIPE values are additive to avoided energy and capacity costs. Exh. PSD-BC-1-Revised at 14-15; exh. EVT-DCW-1.

45. The state screening tools currently include the use of the AESC study's rest-of-pool DRIPE values with a 47% downward adjustment. The 47% downward adjustment reflects that a portion of DRIPE is a transfer payment between market actors (45%) and a reduction of

[9] *Order Re: EEU Avoided Costs for 2016-2017 Time Period*, Case No. EEU-2015-04, Order of 12/23/2015; and *Order Re: EEU Avoided Costs, Externality Adjustments, and Other Screening Components for 2017- 2018 Time Period*, Case No. EEU-2015-04, Order of 10/20/2017.

producer profit (2%). Rest-of-pool DRIPE applies to both avoided cost values for energy and capacity. Brown pf. at 12-13.

46. The 47% downward adjustment for DRIPE was determined based on information derived from a 2011 Lawrence Berkeley National Laboratory ("LBNL") report on movement in price levels of natural gas between producers and consumers: *Effect of Energy Efficiency Standard on Natural Gas Prices*, Michael Carnell, Larry Dale, and Alex Lekov, July 2011 ("2011 LBNL study"). Allen supp. pf. at 13-14.

47. In 2016, Michael Carnell, Larry Dale, and Alex Lekov updated their analysis with greater focus on the electricity sector in a journal article: *The Economic Effects of Efficiency Programs on Energy Consumers and Producers, Energy Efficiency*, 2016 ("2016 LBNL analysis"). Allen supp. pf. at 13-14.

48. The 2016 LBNL analysis refers to the direct benefits to consumers from more energy efficiency programs as "technology" benefits and the second order effects of price level changes to either electricity or natural gas that affect all consumers as "pecuniary" effects. The study recognized that technology benefits represent an increase in social welfare and concludes that the pecuniary effects do not affect total social welfare. Although the study found real and substantial benefits to pecuniary losses to producers, the study found pecuniary benefits to consumers of a similar magnitude. Allen supp. pf. at 13-14.

49. The 2016 LBNL analysis supports the position that the price effects that the authors refer to as pecuniary effects represent a transfer between consumers and producers, and that the technology benefits are appropriately recognized as an improvement to social welfare (i.e., an economic benefit). Allen supp. pf. at 13-14.

50. The societal cost test considers the effects on society as a whole, which includes both consumers and producers. Transfers of any sort are not recognized under the societal cost test. Allen reb. pf. at 2.

51. DRIPE represents a simple transfer of a value from resource providers to retail suppliers or their consumers. DRIPE represents a redistribution of value between different economic entities and does not represent a separate net benefit. DRIPE should not be included in the societal cost test used in screening efficiency investments. Allen pf. at 17; Allen supp. pf. at 13-14; Allen reb. pf. at 2; exh. DPS-BC-1-Revised at 14-15.

Discussion

Both Efficiency Vermont and CLF recommend that the Commission adopt screening values for DRIPE. CLF supports the use of the rest-of-pool DRIPE values estimated in the AESC study, while Efficiency Vermont supports the use of the AESC rest-of-pool DRIPE values with a 47% reduction, consistent with current screening practice. Efficiency Vermont maintains that because Vermont relies on measures of price to estimate other avoided cost screening values, changes in prices should reasonably be expected to result in changes in societal cost-effectiveness. Efficiency Vermont contends that the DRIPE effect occurs on account of changes in energy demand and consequently should be considered in cost-effectiveness testing. CLF argues that the price suppression effect of energy efficiency is a benefit to Vermont ratepayers that should continue to be included in the cost-effectiveness screening.

The Department recommends that DRIPE values not be included in the screening of efficiency measures. The Department argues that DRIPE represents a transfer payment, and transfer payments are not recognized under the societal cost test. The Department contends that its position is supported by the reevaluation of DRIPE conducted in the 2016 LBNL analysis.

I recommend that the Commission not adopt any portion of the AESC rest-of-pool DRIPE values for use in the screening of efficiency measures. In past decisions, the Commission concluded that the state screening tools should include the use the AESC study's rest-of-pool DRIPE values with a 47% downward adjustment.[10] The 47% downward adjustment reflected that a portion of DRIPE is a transfer payment between market actors (45%) and a portion is a reduction of producer profit (2%). The 47% downward adjustment for DRIPE was determined based on information derived from a 2011 LBNL report on the movement in price levels of natural gas between producers and consumers. This study has been updated with greater focus on the electricity sector. The 2016 LBNL analysis concludes that DRIPE is a transfer payment and supports the position that no portion of DRIPE should be included in the state screening tools.

[10] *Order Re: Demand Reduction Induced Price Effect*, Case No. EEU-2013-07, Order of 4/4/2014; *Order Re: Demand Reduction Induced Price Effect and Distribution Line Loss Values*, Case No. EEU-2013-07, *Order of 10/24/2014; Order Re: EEU Avoided Costs for 2016-2017 Time Period*, Case No. EEU-2015-04, Order of 12/23/2015; and *Order Re: EEU Avoided Costs, Externality Adjustments, and Other Screening Components for 2017- 2018 Time Period*, Case No. EEU-2015-04, Order of 10/20/2017.

Specifically, the 2016 LBNL analysis confirms that the movement in price levels due to energy efficiency programs is a transfer between consumers and producers and thus does not affect total social welfare. The societal cost test considers the effects on society as a whole, which includes both customers and resource providers. Transfers of any sort are not recognized under the societal cost test. DRIPE represents a simple transfer of value from resource providers, to retail suppliers or their consumers. As such, DRIPE represents a redistribution of value between different economic entities and does not represent a separate net benefit that should be included in the societal cost test used in screening efficiency investments.

G. Risk Adjustment and Wholesale Risk Premium

52. The AESC study includes avoided cost values for energy and capacity. The methodology used to calculate these avoided costs includes assumptions regarding the wholesale risk premium. Cotterill pf. at 4-5; exh. DPS-BC-1 at 4-5; exh. EVT-DW-1.

53. The wholesale risk premium captures various costs that distribution utilities incur in addition to the cost of acquiring wholesale energy and capacity. These additional costs cannot be determined or hedged in advance and include the cost of variances in load and committed resources and to a lesser degree hourly energy balancing, transitional capacity, ancillary services, and uplift charges. The difference between forecasted and actual loads and generation (driven by weather, the economy, and customer migration) results in distribution utilities balancing their real-time energy needs with purchases or sales at the locational marginal price. Fischer pf. at 7-9; exh. DPS-BC-1-Revised at 4-5; exh. EVT-DCW-1 at Appendix A, page 253.

54. The wholesale risk premium captures the risks associated with the wholesale markets and variances in load and committed resources. The largest load and resource variances tend to be concentrated in the winter for New England. The increased reliance on intermittent power and winter price volatility stemming from natural gas constraints contribute to these variances. Fischer pf. at 7-9.

55. A wholesale risk premium of 4% in the winter months and 0% in the summer months reflects the seasonal variation in risk associated with the New England system. Fischer pf. at 7-9; Brown pf. at 11-12; exh. DPS-BC-1-Revised at 4-5.

56. The risk adjustment intended to address system-wide risks associated with the procurement of supply resources. The state screening tools currently include a 10% discount applied to the price of demand-side options. Brown pf. at 11; exh. DPS-BC-1-Revised at 18.

57. Thirty years ago, the supply-side environment was characterized by large capital-intensive central station commitments for base-load generation with long lead times for investments. These included investments in nuclear or coal resources. The planning and build cycle for these resources was in excess of seven years. The current generation mix for new resources includes solar, wind, and natural gas resources. The planning and build cycle for these resources is more typically in the 18-month to 36- or 48-month timeframe. Allen pf. at 14.

58. Since 1997, the New England region has had a formal competitive wholesale electricity market with a centralized operator (ISO New England) that manages the operation of the grid and manages the markets in which it operates. Allen pf. at 15.

59. Vermont distribution utilities can purchase electricity on a day-ahead basis or in real-time. Contracts for energy or capacity can be weekly, monthly, seasonal, or annual. Thirty years ago the norm was shared ownership of large central station generators or large system contracts. Allen pf. at 15.

60. The state screening tools currently include a risk adjustment of a 10% discount applied to the price of demand-side options for natural gas and unregulated fuels. The 10% discount addresses the risk of price volatility and infrastructure risk associated with natural gas and fuel oil. Exh. DPS-BC-1-Revised at 18.

Discussion

The Department and Efficiency Vermont recommend that the methodology used to determine the avoided cost values for energy and capacity in the AESC study include a wholesale risk premium of 4% in the winter period and 0% in the summer period. I recommend that the Commission approve this approach. The wholesale risk premium captures the risks associated with the wholesale markets and variances in load and committed resources. These risks tend to be concentrated in the winter for New England. The recommended wholesale risk premium values reflect the seasonal variation in risk.

In the current screening process, the wholesale risk premium was assumed to be 0% when determining the avoided cost values for energy and capacity in the AESC study. The Commission previously determined that the risks accounted for in the wholesale risk premium are captured in the risk adjustment intended to address system-wide risks associated with the procurement of supply resources (a 10% discount applied to the price of demand-side options in the current state screening tools).[11] The Department proposes that the wholesale risk premium and risk adjustment be treated as separate assumptions.

The Department recommends a risk adjustment value of a 10% discount to the price of demand side resources for natural gas and unregulated fuels and a 5% discount for electricity. The Department argues that reducing the risk adjustment for electricity is appropriate now because the character of electric supply has changed over the last 30 years from when the risk adjustment was first adopted by the Commission. The Department argues that electric supply-side resources are being replaced with lower-emitting supply sources (natural-gas-fired and renewable generation) and that these supply-side investments require less planning and building lead-time and are generally less costly that those built 30 years ago. The Department also contends that with the establishment of ISO New England, there is now a vibrant marketplace for contracts that allow for differentiation of resources by time, scale, supply characteristics, and attributes. As such, the Department argues that electric generation resources and options being planned today carry less risk to Vermont's utilities.

Efficiency Vermont argues that energy efficiency remains a very low-risk method to acquire cost-effective energy resources and that while the technologies used to generate electricity are changing, the factors that differentiate demand resources from supply have not materially changed since the time the risk adjustment was developed. Efficiency Vermont argues that there are additional risks avoided by demand-side resources, including interruption from large-scale weather events, terrorist attacks, and other catastrophic disruptions. Efficiency Vermont contends that while there have been changes in the supply and demand resource sectors, the Department has not provided clear and convincing evidence to support such a

[11] *Order Re: EEU Avoided Costs, Externality Adjustments, and Other Screening Components for 2017-2018 Time Period*, Case No. EEU-2015-04, Order of 10/20/2017; *Order Re: EEU Avoided Costs for 2016-2017 Time Period*, Case No. EEU-2015-04, Order of 12/23/2015.

substantial reduction in the risk adjustment. Efficiency Vermont maintains that using separate risk adjustment values for electric and fuel savings adds implementation complexity and necessitates updates to the state screening tools because those tools are not currently designed to employ different risk adders for different measures.

CLF argues that energy efficiency continues to provide benefits by reducing the risk associated with purchasing electricity supply. CLF contends that the current 10% risk adjustment is reasonable and should continue to be used in the cost-effectiveness screening of energy efficiency.

I recommend that the Commission adopt a risk adjustment value of a 5% discount applied to the price of demand-side options and adopt the recommendation that the risk adjustment and the wholesale risk premium be accounted for as separate assumptions in the state screening tools. The reduction in the risk adjustment value acknowledges the changes in the electric sector that have occurred since the Commission first established a risk adjustment to be used when screening electric efficiency investments.[12] Over the past 30 years, and in particular over the last several years, new supply-side investments are primarily natural-gas-fired and renewable generation that require less planning and building lead-time and are less costly. Since 1997, the New England region has had a formal competitive wholesale electricity market with ISO New England managing the operation of the grid and the markets. Vermont distribution utilities can now purchase electricity on a day-ahead basis and real-time basis or through contracts on weekly, monthly, seasonal, or annual basis. Thus, the electric generation resources and purchase options available today carry less risk to Vermont's distribution utilities.

In addition, the reduction in the risk adjustment value acknowledges that the wholesale risk premium will be accounted for as a separate assumption in the state screening tools. Because I am recommending that a wholesale risk premium be applied in the determination of avoided costs for energy and capacity, it is appropriate that the risk adjustment value applied in the screening tool be reduced. The recommended wholesale risk premium values (4% in the winter period and 0% in the summer period) reflect the seasonal variation in risk and the

[12] The Commission established a risk adjustment value of 10% in 1990. *See* Docket 5270, Order of 4/19/1990.

recommended risk adjustment (5% discount) is intended to address the overall system-wide risks associated with the procurement of supply resources.

Efficiency Vermont maintains that using separate risk adjustment values for electric and fuel savings necessitates updates to the state screening tools. I expect that the Department will work with the EEUs to implement the changes in the state screening tools.

Further, I recommend that the Commission adopt the risk adjustment value of a 10% discount applied to the price of demand-side options for natural gas and unregulated fuels proposed by the Department. Efficiency Vermont and CLF agree with the recommendation. The 10% discount addresses the risk of price volatility and infrastructure risk associated with natural gas and fuel oil and is consistent with past decisions.[13]

H. Transmission and Distribution Component of Avoided Costs

61. The AESC study included an analysis of costs of pooled transmission facilities that are avoided through construction of energy efficiency projects. The AESC study estimated that the annualized avoided cost for pooled transmission facilities is $94 per kW-year in 2018 dollars. The value is applied to the reduction in summer peak load. Westman pf. at 13; exh. EVT-DW-1 at 215-216.

62. The AESC study estimated the overall, long-term ratio of transmission and distribution savings per kW of avoided load growth (and hence of a kW of peak savings), rather than identifying specific projects that can be avoided. Exh. EVT-DW-1 at 195-196.

63. The avoided transmission value in the AESC study can be generally applied as if every kW of load reduction in any location will have the same value. This is a useful simplification, which is reasonable for widespread energy efficiency programs. Exh. EVT-DW-1 at 196.

64. The AESC study recognizes that the value of load reductions can be location specific and time dependent. In some places and times, even small load reductions that keep load below the capacity of existing equipment may avoid very large incremental transmission and

[13] *Order Re: EEU Avoided Costs, Externality Adjustments, and Other Screening Components for 2017-2018 Time Period,* Case No. EEU-2015-04, Order of 10/20/2017; and *Order Re: Cost-Effectiveness of Heating and Process-Fuel Efficiency Measures and Modifications to State Cost-Effectiveness Screening Tool*, Order of 2/7/2012

distribution investments. In other places and times, relatively large load reductions may have little effect on investments. Exh. EVT-DW-1 at 196-204.

65. The AESC study recognizes that reductions in load may avoid new transmission facilities and their associated operation and maintenance costs. In addition, lower loads will also tend to reduce the rate of failures of existing equipment and thus the capital and operation and maintenance costs involved in repairing and replacing the damaged equipment. Exh. EVT-DW-1 at 205.

66. The AESC study recognizes that reliability projects may have some avoidable components. For example, a load reduction may allow for deferral of a reliability project to a later date or may even serve as a substitution for a transmission and distribution reliability investment. Exh. EVT-DW-1 at 212.

67. ISO New England and transmission providers typically analyze system operation during the peak period to determine the transmission infrastructure required to serve demand. The annual transmission investment is therefore related to peak demand in a year, and not to the change in demand. Exh. EVT-DW-1 at 213.

68. VELCO takes the energy efficiency measures implemented and planned by Vermont EEUs in the Demand Resource Plan into account in its planning. Efficiency Vermont works with distribution utilities to help them to ensure that the effects of future energy efficiency programs are being characterized in their long-term load forecasts and Integrated Resource Plans ("IRPs"). Westman pf. at 13-14.

69. ISO New England periodically performs a needs assessment for relevant regions of New England. The last needs assessment for Vermont performed by ISO New England in 2014 indicated that Vermont can sustain loads of 1017 MW without violating transmission planning standards for performance and reliability. ISO New England concluded in 2017 that no further needs assessment was needed for Vermont through the 2027 planning cycle. Allen supp. pf. at 9; exh. CLF-PLC-4.

70. Since the 2013/14 winter period, the Vermont winter peak load has been higher than the summer peak load. The winter peak load has been relatively constant at roughly 1000 MW. The summer peak load has decreased from 1040 MW in 2013 to approximately 950 MW in 2016

and 905 MW in 2017. The 2017 summer peak load was significantly lower than expected primarily due to the cooler than usual summer season. Exh. CLF-PLC-3 at 18.

71. The 2018 Vermont Long-Range Transmission Plan identifies no reliability deficiencies, due to declining loads and increased distributed generation and energy efficiency. Exh. CLF-PLC-2 at 4; exh. CLF-PLC-3 at 6 and 20-21.

72. The 2018 Vermont Long-Range Transmission Plan provides a 20-year forecast of load during extreme weather conditions ("90/10" forecast). The load forecast projects net summer peak load levels in 2018, 2028, and 2037 of 991 MW, 1000 MW, and 1092 MW, respectively. The corresponding net winter peak load levels are 960 MW, 977 MW, and 1054 MW, respectively. The net forecasts include projected energy efficiency reductions and demand response that has qualified in the ISO New England forward capacity auctions. Exh. CLF-PLC-3 at 15.

73. The 90/10 forecast projects that load reduction measures will decrease the summer peak load for the years 2018 through 2028 and also projects that starting in 2029, heat pump and electric vehicle loads will increase the load to the point where the summer peak load will exceed the 1000 MW load level. The 90/10 forecast projects that the summer peak load will not return to the 1040 MW load level until after 2025, and that summer peak load will not reach the historical all-time peak load level of 1118 MW set in 2006. Exh. CLF-PLC-3 at 15; exh. DPS-BC-1-Revised at 16.

74. The 2018 Vermont Long-Range Transmission Plan provides a 20-year forecast of load under a high load scenario. The high load scenario assumes increased electrification from higher heat pump and electric vehicle use. The summer high load forecast is higher than the base load forecast by 12 MW in 2027, 36 MW in 2032, and 79 MW in 2037. The winter high load forecast is higher than the base load forecast by 23 MW in 2027, 68 MW in 2032, and 130 MW in 2037. Exh. CLF-PLC-3 at 23.

75. The 10-year study performed by ISO-NE in 2014 identified bulk system reliability issues in the Connecticut River area. These concerns were addressed by the recently completed VELCO Connecticut River project. The 2018 Vermont Long-Range Transmission Plan concluded that there are no bulk system reliability concerns within the first ten years of the planning horizon and that reliability concerns would only occur beyond fifteen years, and

therefore would not require any grid reinforcements to be further evaluated in the current 10-year planning cycle. This lack of reliability concerns is the result of lower load levels and Vermont's ability to rely on tie lines with New York and New Hampshire. Exh. CLF-PLC-3 at 27.

76. The 2018 Vermont Long-Range Transmission Plan concluded that a review of the high load forecast showed no major load increase within the first ten years of the study. Beyond the ten-year period, the higher load forecast would only advance the timing of potential transmission concerns by three years. The conclusions of the bulk system assessment are unchanged, since the timing of future transmission concerns would continue to be beyond the ten-year planning horizon. Exh. CLF-PLC-3 at 28.

77. The 2018 Vermont Long-Range Transmission Plan concluded that the Rutland area concerns previously identified in the 2015 long range plan have been resolved by lower loads and by connecting the Florence system to the Rutland system as described in the Green Mountain Power ("GMP") Rutland Area Reliability Plan. The North Rutland transformer overload is postponed to 2031 at a 1028 MW load level. Exh. CLF-PLC-3 at 29.

78. The 2018 Vermont Long-Range Transmission Plan acknowledges the value that energy efficiency has provided in reducing transmission and distribution investments since 2015. The 2018 plan states that several of the reliability issues identified in 2015 have been resolved as they are pushed beyond the 10-year horizon due to lower load levels. Chernick pf. at 24; exh. CLF-PLC-3 at 30.

79. The 2018 Vermont Long-Range Transmission Plan identifies six sub-transmission areas with potential reliability issues. The plan notes that flexibility is permitted at the sub-transmission level because sub-transmission is not subject to federal reliability standards. The affected distribution utilities are required to address the reliability issues. Chernick pf. at 24; exh. CLF-PLC-3 at 30-31.

80. GMP's 2018 IRP indicates that load growth is still expected on some parts of its sub-transmission and distribution system. Eighteen projects are identified in the IRP where load growth likely contributes to the need for transmission and distribution investments. While not all projects identified could be avoided or delayed by reducing load growth or load levels, the range and magnitude of projects indicate that Vermont continues to add load-related transmission and distribution investments that may be avoided by load reductions. Chernick pf. at 26-30.

81. The Vermont System Planning Committee was specifically tasked with identifying geographic locations where targeted energy efficiency could defer needed transmission and distribution investments. No such areas have been identified since 2012. Exh. DPS-BC-1-Revised at 15.

82. The presence of significant amounts of behind-the-meter solar has significantly changed the Vermont system. In some areas, the avoided costs of transmission and distribution could be negative. For example, if a distribution or sub-transmission circuit reached its hosting capacity for behind-the-meter solar, then energy efficiency measures, which would reduce the load that can absorb that solar output, could trigger the need for distribution or sub-transmission upgrades. Exh. DPS-BC-1-Revised at 15-16.

Discussion

The screening tools for energy efficiency currently include avoided cost values to reflect the impacts of energy efficiency on the need for transmission and distribution infrastructure. The screening tools currently include two sets of values, transmission and distribution avoided costs used by Efficiency Vermont to screen all measures in its territory and by BED to screen for prescriptive measures offered jointly with Efficiency Vermont and BED-specific values used by BED to screen custom efficiency measures.

Efficiency Vermont and CLF recommend that the Commission adopt the avoided cost value for transmission and distribution of $94/kW-year determined in the AESC study. Efficiency Vermont argues that energy efficiency is a low-cost, low-risk means to assure that the service life and economic usefulness of transmission and distribution resources are preserved and enlarged. Efficiency Vermont maintains that continued efficiency investment is contemplated under the forecasts used by VELCO and distribution utilities in their long-term plans and that sustained efficiency investments are required to help to cost-effectively avoid or defer transmission and distribution infrastructure investments. Efficiency Vermont further maintains that the avoided cost reflects energy efficiency value in managing the transition of the grid due to the electrification of the space and water-heating sector and the transportation sector.

CLF argues that Vermont continues to incur transmission and distribution costs due to load that can be avoided by energy efficiency investments. In addition, CLF argues that energy efficiency continues to provide the benefit of reducing the need for upgrades to the transmission

and distribution systems in Vermont and in the region. CLF contends that with programs in place to increase electrification by installing heat pumps and promoting electric vehicles, it is reasonable to assume that additional transmission and distribution savings will continue to be provided by energy efficiency resources. CLF maintains that its claim that energy efficiency avoids transmission and distribution investments is supported by the data and analysis provided by ISO New England, the Vermont System Planning Committee, and distribution utility IRPs.

The Department recommends that the avoided cost values for transmission and distribution be reduced to zero in the state screening tools. The Department claims that the values should be set to zero because: (1) there has been no New England-wide growth in loads that drive additional bulk transmission investment since 2006; (2) within Vermont loads are expected to remain on a flat to declining trajectory for the foreseeable future; and (3) the Vermont System Planning Committee has not identified geographic locations where targeted energy efficiency could defer needed transmission and distribution investments since 2012. The Department further argues that investments made to Vermont's transmission and distribution system to address reliability concerns cannot be avoided through energy efficiency measures. In addition, the Department argues that investments in the transmission and distribution system made as the result of changes in patterns of flow unrelated to load growth – such as changes resulting from the decommissioning of Vermont Yankee or a new DC line from Hydro-Quebec – cannot be avoided through efficiency investments. With respect to the number of needed transmission and sub-transmission investments identified by CLF, the Department claims that the need for most of these projects is either not related to load growth, that the load levels that trigger the project have already been established, that the fix has already been made regardless of the driver, or that load is but one of the many drivers, and that targeting the load through energy efficiency does not obviate the need for the project. The Department further maintains that to the extent there are certain projects that are load-driven, those issues are more appropriately addressed through geotargeted efficiency programs. The Department contends that there is a significant risk that untargeted programs can exacerbate the pre-existing and growing challenges of low loads in areas with high amounts of solar and other weather-related renewable generation.

As discussed further below, I recommend that the Commission adopt the AESC study value of $94 per kW-year as a transmission and distribution avoided cost value used by

Efficiency Vermont to screen all measures in its territory and by BED to screen for prescriptive measures offered jointly with Efficiency Vermont. I also recommend that the Commission retain the current value of $45 per kW-year for use by BED to screen custom efficiency measures. The values would be applied to summer kW reductions.

The Department has failed to demonstrate that energy efficiency investments completely avoid the need for future transmission and distribution investments. An examination of the 20-year forecasts (90/10 forecast and high load scenario) provided in the 2018 Vermont Long-Range Transmission Plan indicates that peak loads are increasing from Vermont's historical low of 905 MW in 2017.[14] These forecasts assume new energy efficiency reduces future peak load, approximately 16 to 12 MW over the 2018-2037 time period.[15] While the forecasts do not project that Vermont will reach the historical all-time peak load level of 1118 MW set in 2006, the forecasts over the 10- to 15-year horizon project that without new energy efficiency investments Vermont will approach or exceed the 1017 MW level that was identified in the 2014 needs assessment performed by ISO New England.[16] This is particularly the case under the high load scenario that assumes increased electrification from higher heat pump and electric vehicle use. The 20-year forecasts support the conclusion that new energy efficiency investments can play a significant role in avoiding transmission investments, especially over the 10- to 15-year horizon.

Energy efficiency can also avoid the need for future investments in the distribution system. The 2018 Vermont Long-Range Transmission Plan identifies six sub-transmission areas with potential reliability issues. GMP's 2018 IRP indicates that load growth is still expected on some parts of its sub-transmission and distribution system and identifies several areas where load growth likely contributes to the need for transmission and distribution investments. While not all projects identified are likely avoided or delayed by reducing load levels, the range and magnitude of projects indicate that Vermont continues to add load-related transmission and distribution investments that may be avoided by load reductions. These identified projects

[14] *See* Findings 72-74.

[15] *Order Re: Development and Support Service Budgets, Evaluation Budgets, Other Program Budgets, Forecasts of Expected Savings, and Performance Targets*, Case No. EEU-2016-03, Order of 10/12/17 at Appendix A.

[16] ISO New England in 2014 indicated that Vermont can sustain loads of 1017 MW without violating transmission planning standard for performance and reliability. *See* Finding 69.

support the conclusion that new energy efficiency investments can play a significant role in avoiding distribution investments.

The Department's recommendation of a zero value for the avoided cost of transmission and distribution ignores the demands on the transmission and distribution system in the future that would be significantly greater without new energy efficiency efforts and ignores that new efficiency investment is contemplated under the forecasts used by VELCO and distribution utilities in their long-term plans. The Department's recommendation fails to recognize the incremental value of efficiency investments. Reliability projects may have some avoidable components and a load reduction may allow for deferral of a reliability project to a later date or may avoid some portion of the project. In addition, the Department's recommendation fails to recognize that the reductions in load may reduce operation and maintenance costs. Lower loads will also tend to reduce the rate of failures of existing equipment and avoid the capital and operation and maintenance costs involved in repairing and replacing the damaged equipment.

The value of load reductions can be location specific and time dependent. In addition, certain portions of Vermont may benefit from geotargeted efficiency programs, and untargeted programs can exacerbate the challenges of low loads in certain areas. However, it is still appropriate to apply an avoided cost value for transmission and distribution as if every kW of load reduction in any location will have the same value. This simplification is reasonable for widespread energy efficiency programs that cover the entire state and where measures are being screened for use across the entire state.

Participants provided only two recommendations for an avoided cost value: zero or the AESC study value of $94 per kW-year. While I am concluding that energy efficiency avoids transmission and distribution investments, I recognize that the AESC study value is not based on the study that includes the Vermont transmission system and instead is based on analysis of the transmission systems from other New England states. Given that Vermont is part of the New England system and in the absence of any other positive value, I recommend that the Commission adopt the AESC study value of $94 per kW-year as a transmission and distribution avoided cost value used by Efficiency Vermont. This value can be reviewed in future scheduled updates to efficiency screening components.

I recommend that the Commission retain the current value of $45 per kW-year for use by BED. Efficiency Vermont and CLF did not specifically address whether their conclusion about avoided costs applied to BED's distribution system. In the absence of any specific recommendation, I recommend that the Commission retain the current value used in state screening tools. This value can also be reviewed in future scheduled updates to efficiency screening components.

I. Distribution Line Loss Values

83. The tools used for screening programs and measures by the EEUs include distribution line loss values. The values are calculated to reflect the line losses that are specific to the Vermont distribution system. Brown pf. at 14; Cotterill pf. at 8; exh. DPS-BC-1-Revised at 16-17.

84. The AESC study includes an assumption for electrical losses on the distribution system of 8% that is applied to avoided costs for capacity and electricity. Fischer pf. at 9-10; exh. DPS-BC-1-Revised at 5.

85. The state screening tools currently include Vermont-specific distribution line loss values that further adjust the avoided cost values provided from the AESC study to apply to savings at the customer meter. Brown pf. at 13-14; Cotterill pf. at 8; exh. DPS-BC-1-Revised at 16-17.

86. The Vermont-specific distribution line loss values are calculated as the marginal losses in each of four costing periods: winter peak, winter off-peak, summer peak, and summer off-peak. The four sets of values are calculated separately for use by Efficiency Vermont and BED. Cotterill pf. at 8; exh. DPS-BC-1-Revised at 16-17.

Discussion

The Department and Efficiency Vermont recommend that the avoided costs for energy and capacity in the AESC study include a distribution line loss value of 8%, with further adjustments in the state screening tools using Vermont-specific distribution line loss values. I recommend that the Commission approve this approach. In the current screening process, the line-loss value for avoided costs for energy in the AESC study is set to 0% and then the 8% value is applied in the state screening tools, whereas for capacity, the line-loss value is set to 8%

in the AESC study. The proposed methodology, applying the 8% in the AESC study, is more consistent and is a less confusing application that does not significantly change the calculated amount of distribution line losses.

The state screening tools include Vermont-specific distribution line loss values that further adjust the avoided cost values provided from the AESC study (values that include a line-loss value of 8%). The Vermont-specific distribution line loss values used in screening efficiency measures were last reviewed and approved by the Commission in October of 2017. The Department and Efficiency Vermont recommend that no changes be made to these values for use in the 2020-2021 performance period. The Department and Efficiency Vermont have reviewed the values and agree that previously calculated values remain reasonable for the current performance period. I recommend that the Commission approve the recommended distribution line loss values.

The recommended statewide values for distribution line loss will be used by Efficiency Vermont to screen all measures in its territory and by BED to screen for prescriptive measures offered jointly with Efficiency Vermont. The BED-specific values for distribution line loss will be used by BED to screen custom efficiency measures. The distribution line loss values that I recommend that the Commission approve are provided in the Attachment to this proposal for decision.

J. Discount Rate, Non-Energy Benefits Adjustment, and Low-Income Adjustment

87. The state screening tools currently include a discount rate of 3%. Cotterill pf. at 6; exh. DPS-BC-1-Revised at 6.

88. The state screening tools currently include a non-energy benefits adjustment consisting of a 15% adder to energy benefits. The non-energy benefits adjustment applies to both electric and thermal-energy-and-process-fuels measures. The non-energy benefits adjustment is intended to capture the perceived, financial, or intangible benefits accrued by energy efficiency measures including, from a customer's perspective, increased comfort, convenience, and health and, from a utility perspective, reduced utility shut-offs and bill complaints. Cotterill pf. at 8; exh. DPS-BC-1-Revised at 18.

89. The state screening tools currently include a low-income adjustment consisting of a 15% adder to the energy benefits of projects in the low-income sector. The low-income benefits adjustment is intended to capture the additional benefits to low-income customers and society that result from energy efficiency investments in the low-income sector. Cotterill pf. at 8; exh. DPS-BC-1-Revised at 18.

Discussion

I recommend the use of 3% discount rate in the screening of efficiency measures. This value is recommended by the Department and Efficiency Vermont. The 3% value is consistent with the value used in the determination of avoided cost values for energy and capacity. The 3% discount rate is currently used in the state screening tool and consistent with previous cost-effectiveness screening determinations.[17]

The schedule in this proceeding concluded that the investigation would be conducted in two tracks, with the second track addressing screening values for the non-energy benefits adjustment and low-income adjustment. As determined in previous cost-effectiveness screening proceedings, the state screening tools currently include a non-energy benefits adjustment consisting of a 15% adder to energy benefits and a low-income adjustment consisting of a 15% adder to the energy benefits of projects in the low-income sector.[18] I recommend that the EEUs continue to use these values when they perform cost-effectiveness screening of energy efficiency measures unless and until updated values are determined in the second track to this proceeding.

I recommend that the Commission require participants to file recommendations with respect to the non-energy benefits adjustment and a low-income adjustment including scheduling recommendations. I recommend that the deadline for this filing be within 30 days of the issuance of this Commission Order.

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[17] *Order Re: EEU Avoided Costs, Externality Adjustments, and Other Screening Components for 2017-2018 Time Period,* Case No. EEU-2015-04, Order of 10/20/2017; *Order Re: EEU Avoided Costs for 2016-2017 Time Period*, Case No. EEU-2015-04, Order of 12/23/2015; and *Order Re: EEU 2013 Avoided Costs*, Case No. EEU-2013-07, Order of 12/20/2013.

[18] *Order Re: EEU Avoided Costs, Externality Adjustments, and Other Screening Components for 2017-2018 Time Period,* Case No. EEU-2015-04, Order of 10/20/2017; *Order Re: EEU Avoided Costs for 2016-2017 Time Period*, Case No. EEU-2015-04, Order of 12/23/2015; *Order Re: EEU 2013 Avoided Costs*, Case No. EEU-2013-07, Order of 12/20/2013; and *Order Re: Cost-Effectiveness of Heating and Process-Fuel Efficiency Measures and Modifications to State Cost-Effectiveness Screening Tool*, Order of 2/7/2012.

V. CONCLUSION

In this proposal for decision, I recommend the Commission approve updated avoided costs, externality adjustments, and other screening components for use by the EEUs when they perform cost-effectiveness screening of energy efficiency measures.

This proposal for decision was served on all parties to this proceeding in accordance with 3 V.S.A. § 811.

Mary Jo Krolewski

Mary Jo Krolewski
Hearing Officer

VI. COMMISSION DISCUSSION AND CONCLUSIONS

The Department, Efficiency Vermont, BED, CLF, GMP, and VGS filed comments on the proposal for decision. The participants recommended some clarifications and modifications to the Hearing Officer's recommendations. Based on our review of the proposal for decision and the participants' comments, we adopt, with clarifications, the conclusions and recommendations of the Hearing Officer. The participants' comments and our determinations are addressed separately below by topic area.

In addition, CLF filed a motion to strike portions of comments on the proposal for decision. Our determination with respect to the motion to strike is addressed below.

Motion to Strike

CLF filed a motion to strike portions of the comments on the proposal for decision filed by the Department, BED, and GMP. CLF asserts that the comments present new information not contained in the record concerning the externality adjustments and transmission and distribution avoided costs. With respect to the externality adjustment, CLF argues that the comments seek to introduce new factual evidence on RES Tier 3 measures. With respect to avoided costs for transmission and distribution, CLF argues that the Department's comments suggest a modification that was not previously considered in the proceeding.

The Department and GMP oppose CLF's motion. With respect to the externality adjustment, the Department and GMP contend that they did not seek to offer new factual evidence into the record. Instead, in citing to Tier 3 measures, the intent was to offer the Commission an alternative means for evaluating evidence in the record by expanding upon the discussion of RES requirements that were cited extensively in this proceeding. With respect to the transmission and distribution avoided costs, the Department argues that it did not present any new facts or arguments. Rather, it recommended that the Commission adopt the value as a rebuttable presumption until a Vermont-specific value can be developed.

We deny CLF's motion to strike portions of the comments of the Department, GMP, and BED. The comments do not seek to offer new factual evidence into the record, but instead reference RES Tier 3, a Vermont law. The discussion of Tier 3 expands upon an argument on the environmental externality adjustments contained in the Department's brief and reply brief.

The effect of the RES requirements on externality adjustments was addressed in the proposal for decision and a discussion of Tier 3 requirements is an appropriate expansion to help illuminate arguments concerning the RES. Further, CLF and Efficiency Vermont also provided reply comments on the Tier 3 issues raised in the comments, and we considered these reply comments in our determination. With respect to transmission and distribution avoided costs, the Department's comments did not present any new facts or argument. CLF offers no compelling basis for barring the Department from taking a position for the Commission's consideration.

Time-Based Energy Avoided Costs and Winter Capacity Avoided Costs

Participants' Comments

Efficiency Vermont supports having additional process with the Department and stakeholders, including the distribution utilities to explore the development of hourly avoided costs. Efficiency Vermont notes that this process aligns with Efficiency Vermont's proposal to offer flexible load management services now pending approval in Case No. 19-3272-PET.

Discussion and Conclusions

We adopt the Hearing Officer's recommendation not to establish hourly avoided costs in this proceeding. As recommended by the Hearing Officer, we encourage the Department and Efficiency Vermont to conduct additional process to consider how hourly avoided costs may be used in the future. We also encourage the distribution utilities and other stakeholders to participate in that process.

Environmental Externality Adjustments

Participants' Comments

The Department asks that the Commission not adopt the Hearing Officer's recommendations with respect to the environmental externality adjustments. Instead, the Department recommends that the Commission adopt the externality adjustment values for energy determined in the AESC study multiplied by the percentage of future load that is not obligated to be served with renewable generation under the RES, starting at 45% in 2018 and declining to 25% in 2032 and beyond.

The Department offers three reasons for its position. First, the Department maintains that the determination regarding avoided costs must take into account the breadth of Vermont policy

within which energy efficiency programs operate and should be consistent with the treatment of efficiency in other programs. Second, the Department believes its recommendation appropriately balances the cost side of the societal test with the benefit side of the societal test. Third, the Department maintains that its recommendation is supported by recent Commission decisions on externality adjustments cited by the Hearing Officer in the proposal for decision.

GMP supports the notion of consistency between the determination of avoided costs and avoided externalities, but is concerned that the proposal for decision will not actually achieve the desired consistency because natural-gas-fired generation is not the appropriate marginal source upon which to evaluate energy efficiency in Vermont where electricity requirements are already significantly, and increasingly, renewable. GMP maintains that the Department's recommendation is the type of state-specific adjustment contemplated in the AESC study and is the most reasonable approach to approximate the net externality benefits of deploying energy efficiency in Vermont.

BED supports the Department's comments addressing externality adjustments. BED argues that supportive regulatory policies should be consistently applied across the state's various policy directives.

Efficiency Vermont supports the proposal for decision recommendation to adopt the environmental externality adjustment values determined in the AESC study. Efficiency Vermont argues that the AESC study appropriately calculates externality adjustments. Efficiency Vermont maintains that the proposal for decision accurately reflects how efficiency serves to reduce the marginal generation sources in the regional power pool.

CLF argues that the proposal for decision consistently applies Vermont's energy policies in determining the avoided costs and the avoided externalities that result from Vermont's reliance on energy efficiency. CLF maintains that energy efficiency resources reduce electricity demand and reduce the emissions and pollution that result from electricity supply at the margins.

Discussion and Conclusions

We adopt the Hearing Officer's recommendation that the externality adjustment values for energy determined in the AESC study be used in efficiency screening. We conclude that the AESC externality adjustment values reasonably account for the RES requirements and other New England renewable portfolio standards.

In comments on the proposal for decision, participants generally agree that it is appropriate to determine both the energy costs avoided and the externalities avoided based on the same marginal resource. That is, the cost side of the societal test should balance the benefit side. The issue that remains among the participants is whether the externality adjustments determined in the AESC study use the representative marginal resource.

In determining the avoided-cost values for energy, the AESC study explains that the supply curve consists of an array of resources, which include renewables and natural-gas-fired units and identifies that the marginal resource varies across the study period. Thus, the determination of avoided costs includes the assumption that renewable resources are sometimes the marginal unit setting price. The AESC study provides its assumptions about the generation mix across the study period, with natural-gas-fired generation being a steady, majority supply across the period and renewable generation increasing across the period.[19] The study period and generation mix assumes that the RES and other New England renewable portfolio standards are in place. While the AESC study concludes that the marginal unit may sometimes be a renewable resource, the study uses a natural-gas-fired unit to determine the externality adjustments.

We conclude that the externality adjustments in the AESC study represents a reasonable assumption about the future costs of avoided environmental externalities. The AESC study finds that the marginal energy supply in New England continues to be predominantly produced by natural-gas-fired generation, even with the implementation of the RES and other state renewable portfolio standards. Like the avoided costs for energy in the AESC study that are used in the Vermont screening tools, the externality adjustment should be based on the marginal unit on the New England system. In most instances during the AESC study period, the marginal unit on the New England system is a natural-gas-fired unit. Thus, the AESC study's use of a natural-gas-fired unit as the marginal unit is a reasonable estimate of future externality costs.

We recognize that the New England generation mix is changing with renewable resources representing an increasing portion of the mix and that the current AESC study may not accurately capture the future generation mix because New England states have continued to adopt new renewable requirements in the time since the study was conducted. We also recognize

[19] Exh. EVT-DCW-1 at 110.

that the marginal unit is not always a natural-gas-fired unit and that some adjustment of the externality values in the AESC study may be appropriate. However, we cannot adopt the Department's recommendation to adjust the externality values based on the RES requirements. The externality values in the screening tools, like the avoided costs for energy, are based on the marginal unit avoided at the New England system level. While the RES makes an important contribution to the changing of the New England generation mix, we do not expect the RES requirements alone to significantly alter the marginal unit on the New England system. Absent a better alternative, we decline to make any adjustments.

The Department argues that recent decisions by the Commission on the externality adjustments support the Department's recommendation. We do not agree. In the past, the AESC study did not account for the RES and other New England renewable portfolio standards, thus affecting the determination of the marginal unit and associated emissions. The Commission adjusted the externality values, using the RES Tier 2 requirements, to account for these shortcomings.[20] In contrast to past AESC studies, the AESC study in this proceeding includes the assumption that the RES and other New England renewable portfolio standards are in effect. Given the changes to the AESC study, our past decisions do not provide guidance in this proceeding.

Participants argue that the Hearing Officer's recommendations on the externality adjustments are not consistent with Vermont policy, including the screening of RES Tier 3 measures and implementation of the RES Tier 3 program. We disagree. Cost-effectiveness screening of Tier 3 energy transformation projects is governed by the requirements of 30 V.S.A. § 8004(a)(3)(F)(iii). These requirements recognize that the screening of Tier 3 measures and energy efficiency measures implemented by the EEUs may differ. First, unlike EEU measures, these requirements limit the project cost to the applicable alternative compliance payment rate.[21] Second, consistency with the screening tests developed under Section 209(d) and 218c(a) is only

[20] *Order Re: EEU Avoided Costs for 2016-2017 Time Period*, Case No. EEU-2015-04, Order of 12/23/2015; and *Order Re: EEU Avoided Costs, Externality Adjustments, and Other Screening Components for 2017- 2018 Time Period*, Case No. EEU-2015-04, Order of 10/20/2017.

[21] 30 V.S.A. § 8004(a)(3)(C)(iv).

required when "applicable."[22] Our determinations in this proceeding are consistent with RES Tier 3, and do not alter the screening of RES Tier 3 measures.

DRIPE

Participants' Comments

Efficiency Vermont recommends that DRIPE be included in the state screening tools, using the AESC study rest-of-pool DRIPE values with a 47% downward adjustment to reflect that a portion of DRIPE is a transfer payment between market actors (45%) and a reduction of producer profit (2%). Efficiency Vermont maintains that because Vermont relies on indicators of price to estimate other avoided-cost screening values, changes in price induced by a measure should reasonably be expected to result in benefits towards societal cost-effectiveness. Efficiency Vermont notes that Vermont's application of the societal test routinely measures the cost of an energy supply resource with reference to its market price and not its production cost. Because the cost of power supply resources is measured with reference to their market price for purposes of energy efficiency screening, Efficiency Vermont argues that DRIPE is the only mechanism to account for the acknowledged price-lowering impacts of efficiency.

Discussion and Conclusions

We adopt the Hearing Officer's recommendation to not use the AESC rest-of-pool DRIPE values in the screening of efficiency measures. In past decisions, the Commission concluded that the state screening tools should include the use of the AESC study's rest-of-pool DRIPE values with a 47% downward adjustment based on information derived from a 2011 LBNL report on the movement in price levels of natural gas between producers and consumers. This study has been updated with a greater focus on the electricity sector. The 2016 LBNL analysis concludes that DRIPE is a transfer payment and supports the position that no portion of DRIPE should be included in the state screening tools. We agree that transfers of any sort are not recognized under the societal cost test and, as such, DRIPE represents a redistribution of value between different economic entities and does not represent a separate net benefit that should be included in the societal cost test used in screening efficiency investments.

[22] 30 V.S.A. § 8004(a)(3)(F)(iii).

Risk Adjustment and Wholesale Risk Premium

Participants' Comments

Efficiency Vermont states that it supports the continued use of a risk adjustment value of a 10% discount applied to the price of demand-side options. If the Commission adopts the Hearing Officer's recommendation of a 5% discount, Efficiency Vermont proposes that the discount be applied at the funding level rather than the resource level in the state screening tools. In other words, application of the different resource-specific risk adjustment values in the state screening tools would be based on whether the efficiency measure is funded out of the electric or thermal-energy-and-process-fuels portfolios. Efficiency Vermont notes that screening occurs at the measure and portfolio level and there are many measures that include both electric and fuel savings including clothes washers, dishwashers, ventilation controls, and heating, ventilation, and air-conditioning controls. In addition, when screening at the portfolio level, program costs are included in the analysis with no electric or fuel savings, and it is not clear which risk adjustment factor would be applied. In such cases there is no way to apply two different risk adjustment factors in the screening for a single measure within the existing state screening tools. Efficiency Vermont contends that the complexities can be resolved by applying risk adjustment factors based on funding source, rather than resources saved, avoiding a redesign of the screening tools and data tracking systems. Efficiency Vermont contends that this approach is less administratively burdensome while achieving the Hearing Officer's objectives.

Discussion and Conclusions

We adopt the Hearing Officer's recommendation for a risk adjustment value of a 5% discount applied to the price of demand-side options, and we adopt the recommendation that the risk adjustment and the wholesale risk premium be accounted for as separate assumptions in the state screening tools. The wholesale risk premium values (4% in the winter period and 0% in the summer period) reflect the seasonal variation in risk, and the risk adjustment (5% discount) is intended to address the overall system-wide risks associated with the procurement of supply resources. In addition, we adopt the risk adjustment value of a 10% discount applied to the price of demand-side options for natural gas and unregulated fuels. As discussed in the proposal for decision, the 10% discount addresses the risk of price volatility and infrastructure risk associated with natural gas and fuel oil and is consistent with past decisions.

Further, we adopt Efficiency Vermont's recommendation that the application of risk adjustment be based on funding source, rather than resources saved. This approach avoids a redesign of the screening tools and data tracking systems and is less burdensome to implement. The approach is also consistent with the Hearing Officer's recommendation to apply the risk adjustment based on resource type, either electric, natural gas, or unregulated fuels. Under this approach, measures that include both electric and fuel savings would be funded through the portfolio (either the electric EEU funds or the thermal-energy-and-process-fuel funds) where most of the savings occur. Implementing the risk adjustment based on funding should result, in most instances, in the risk adjustment being applied to the appropriate measure.

Transmission and Distribution Component of Avoided Costs

Participants' Comments

The Department states that while it remains concerned about the value determined in the AESC study, it does not oppose adoption of the $94/kW-year value for the transmission and distribution component of avoided costs. The Department further recommends that the value be adopted as a rebuttable presumption until a Vermont-specific value can be developed. The Department concedes that risks associated with generalized load growth may justify an avoided transmission and distribution value greater than zero, but maintains that the AESC value is flawed because it is not consistent with the expected future loads in Vermont and should be improved going forward.

Efficiency Vermont recommends that the Commission reject the Department's recommendation to make the transmission and distribution value a rebuttable presumption until a Vermont-specific value can be developed. Efficiency Vermont argues that the Department can address any Vermont-specific value in a future proceeding. Efficiency Vermont maintains that continued efficiency investment is contemplated under the forecasts used by VELCO and distribution utilities in their long-term plans and that sustained efficiency investments are required to help to cost-effectively avoid or defer transmission and distribution infrastructure investments. The avoided costs also reflect energy efficiency's value in managing the transition of the electric grid due to the electrification of the space and water-heating and transportation sectors.

Discussion and Conclusions

We adopt the Hearing Officer's $94/kW-year value recommendation for the transmission and distribution component of avoided costs. We recognize that this value is not based on a study that includes the Vermont transmission system and instead is based on analysis of the transmission systems from other New England states. However, we do not adopt the Department's recommendation that the value be adopted as a rebuttable presumption until a Vermont-specific value can be developed. The recommendation is unnecessary because the Department can address any Vermont-specific value in the next avoided-cost proceeding.

Non-Energy Benefits Adjustment and Low-Income Adjustment

Participants' Comments

Efficiency Vermont supports the second track of this proceeding addressing the non-energy benefits adjustment and a low-income adjustment. Efficiency Vermont requests that the schedule for the second track provide sufficient time for participants to develop recommendations.

Discussion and Conclusions

The second track of this proceeding will address the non-energy benefits adjustment and a low-income adjustment. We expect that the schedule will provide participants with sufficient time to develop recommendations. Accordingly, participants should file scheduling recommendations for the second track within 30 days of the issuance of this Order.

Implementation Timeline

Participants' Comments

Efficiency Vermont recommends that the implementation of the updated avoided costs, externality values, and other screening components become effective on January 1, 2021, and remain in effect until updated values are approved by the Commission. Efficiency Vermont contends that the adoption of a change in the avoided costs used for screening purposes mid-year will cause unnecessary administrative burdens. Efficiency Vermont also does not support the values being retroactively implemented.

Discussion and Conclusions

We agree that time must be provided to implement the updates to the avoided costs, externality values, and other screening components. We accept the recommendation that the implementation of the updated avoided costs, externality values, and other screening components become effective on January 1, 2021, and remain in effect until updated values are approved by the Commission.

VII. ORDER

IT IS HEREBY ORDERED, ADJUDGED, AND DECREED by the Vermont Public Utility Commission ("Commission") that:

1. The findings, conclusions, and recommendations of the Hearing Officer are adopted, subject to the clarifications and determinations made in this Order.

2. Effective on January 1, 2021, the avoided energy and capacity costs and the end-use costs for natural gas and other fuels used for screening programs and measures by the Energy Efficiency Utilities ("EEUs") shall be those contained in the Attachment to this Order.

3. Effective on January 1, 2021, the environmental externality adjustments used for screening programs and measures by the EEUs shall be those contained in the Attachment to this Order.

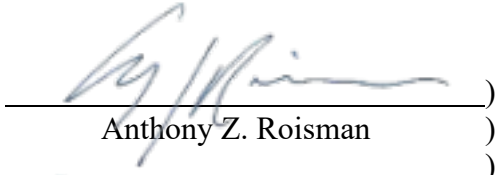
4. Effective on January 1, 2021, the transmission and distribution component of avoided costs and the distribution line loss values used for screening programs and measures by Efficiency Vermont and the City of Burlington Electric Department shall be those contained in the Attachment to this Order.

5. Effective on January 1, 2021, when performing energy efficiency screening, the EEUs shall use: (a) a discount rate of 3%; and (b) a risk adjustment consisting of a 10% discount to the price of demand-side options for natural gas and fuel oil and a risk adjustment consisting of a 5% discount to the price of demand-side options for electricity. The application of risk adjustment in the state screening tools shall be based on EEU funding source.

6. Until a further determination in this proceeding, when performing energy efficiency screening, the EEUs shall use: (a) a non-energy benefits adjustment consisting of a 15% adder to energy benefits; and (b) a low-income adjustment consisting of an additional 15% adder to the energy benefits of projects in the low-income sector.

7. Participants shall file schedule recommendations with respect to the non-energy benefits adjustment and the low-income adjustment within 30 days of the issuance of this Commission Order.

Dated at Montpelier, Vermont this 6th day of July, 2020.



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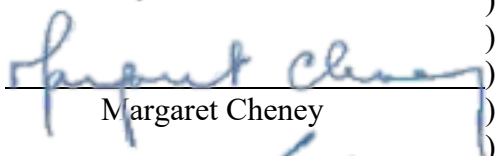
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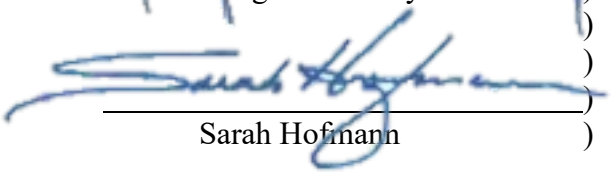
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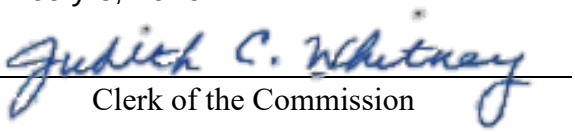
OFFICE OF THE CLERK

Filed: July 6, 2020

Attest: 
Clerk of the Commission

Notice to Readers: This decision is subject to revision of technical errors. Readers are requested to notify the Clerk of the Commission (by e-mail, telephone, or in writing) of any apparent errors, in order that any necessary corrections may be made. (E-mail address: puc.clerk@vermont.gov)

Appeal of this decision to the Supreme Court of Vermont must be filed with the Clerk of the Commission within 30 days. Appeal will not stay the effect of this Order, absent further order by this Commission or appropriate action by the Supreme Court of Vermont. Motions for reconsideration or stay, if any, must be filed with the Clerk of the Commission within 28 days of the date of this decision and Order.

Avoided Energy and Capacity Costs and Externality Costs - Effective January 1, 2021

	Avoided Unit Cost of Electric Energy				Avoided Unit Cost of Capacity	Avoided Externality Costs			
Units:	Winter Peak $/kWh	Winter Off-Peak $/kWh	Summer Peak $/kWh	Summer Off-Peak $/kWh	Weighted Average $/kW-yr	Winter Peak $/kWh	Winter Off-Peak $/kWh	Summer Peak $/kWh	Summer Off-Peak $/kWh
Period:	(2018$)				(2018$)	(2018$)			
2018	0.055	0.051	0.036	0.030	112.9	0.046	0.047	0.045	0.045
2019	0.058	0.054	0.038	0.034	108.0	0.045	0.046	0.043	0.044
2020	0.062	0.058	0.044	0.039	79.8	0.043	0.044	0.042	0.043
2021	0.064	0.060	0.052	0.044	64.7	0.043	0.044	0.042	0.042
2022	0.062	0.057	0.050	0.041	62.2	0.043	0.044	0.042	0.042
2023	0.064	0.057	0.047	0.037	63.5	0.043	0.044	0.042	0.042
2024	0.067	0.063	0.046	0.042	66.1	0.042	0.043	0.041	0.042
2025	0.063	0.060	0.048	0.043	70.9	0.042	0.043	0.041	0.041
2026	0.064	0.060	0.052	0.045	76.9	0.042	0.043	0.041	0.041
2027	0.068	0.064	0.049	0.043	83.0	0.041	0.042	0.040	0.041
2028	0.070	0.062	0.054	0.044	89.1	0.041	0.042	0.040	0.040
2029	0.072	0.066	0.053	0.045	95.2	0.041	0.042	0.040	0.040
2030	0.067	0.063	0.055	0.051	90.6	0.040	0.041	0.039	0.040
2031	0.066	0.062	0.050	0.044	89.1	0.040	0.041	0.039	0.039
2032	0.065	0.061	0.052	0.045	95.2	0.039	0.040	0.038	0.039
2033	0.070	0.062	0.052	0.043	90.6	0.039	0.040	0.038	0.038
2034	0.069	0.058	0.056	0.044	89.1	0.039	0.039	0.038	0.038
2035	0.072	0.064	0.062	0.053	95.2	0.038	0.039	0.037	0.037
2036	0.073	0.065	0.065	0.055	96.8	0.038	0.039	0.037	0.037
2037	0.075	0.065	0.069	0.057	98.4	0.037	0.038	0.036	0.037
2038	0.076	0.066	0.073	0.060	100.0	0.037	0.038	0.036	0.036
2039	0.078	0.067	0.077	0.063	101.7	0.037	0.037	0.036	0.036
2040	0.080	0.067	0.081	0.066	103.4	0.036	0.037	0.035	0.035
2041	0.081	0.068	0.085	0.069	105.1	0.036	0.037	0.035	0.035
2042	0.083	0.069	0.090	0.072	106.9	0.035	0.036	0.034	0.035
2043	0.085	0.070	0.095	0.076	108.6	0.035	0.036	0.034	0.034
2044	0.087	0.070	0.100	0.079	110.5	0.035	0.035	0.034	0.034
2045	0.089	0.071	0.106	0.083	112.3	0.034	0.035	0.033	0.034
2046	0.091	0.072	0.111	0.087	114.2	0.034	0.035	0.033	0.033
2047	0.093	0.073	0.118	0.091	116.1	0.034	0.034	0.033	0.033
2048	0.096	0.074	0.124	0.096	118.0	0.033	0.034	0.032	0.033
2049	0.098	0.076	0.131	0.100	120.0	0.033	0.033	0.032	0.032
2050	0.101	0.077	0.138	0.105	122.0	0.032	0.033	0.032	0.032
Levelized Costs									
10 years (2018-2027)	0.063	0.058	0.046	0.040	79.2	0.043	0.044	0.042	0.042
15 years (2018-2032)	0.064	0.060	0.048	0.042	83.1	0.042	0.043	0.041	0.041
30 years (2018-2047)	0.071	0.063	0.063	0.052	92.0	0.040	0.040	0.039	0.039

Avoided Natural Gas Costs - Effective January 1, 2021

Avoided Cost of Natural Gas by Retail End Use for Vermont Assuming No Avoidable Retail Margin (2018$/MMBtu)						Avoided Peak Day Storage ($/MCF)
Year	Design Day	Peak Day	Remaining Winter	Shoulder/Summer		
2018	559.96	19.00	3.46	3.05		186.20
2019	559.65	19.00	3.15	2.74		186.20
2020	560.57	20.96	4.07	3.66		186.20
2021	561.48	22.91	4.98	4.57		186.20
2022	561.43	24.86	4.93	4.52		186.20
2023	561.46	26.81	4.96	4.55		186.20
2024	561.56	27.24	5.06	4.65		186.20
2025	561.59	27.98	5.09	4.68		186.20
2026	561.68	28.63	5.18	4.77		186.20
2027	561.73	28.98	5.23	4.82		186.20
2028	561.86	29.12	5.36	4.95		186.20
2029	561.97	29.40	5.47	5.06		186.20
2030	562.05	30.13	5.54	5.14		186.20
2031	562.22	30.82	5.71	5.31		186.20
2032	562.24	31.60	5.74	5.33		186.20
2033	562.20	31.64	5.70	5.29		186.20
2034	562.12	32.21	5.62	5.21		186.20
2035	562.16	32.42	5.66	5.25		186.20
2036	562.21	32.83	5.71	5.30		186.20
2037	562.25	33.24	5.76	5.35		186.20
2038	562.30	33.66	5.81	5.40		186.20
2039	562.35	34.08	5.86	5.45		186.20
2040	562.40	34.50	5.91	5.51		186.20
2041	562.45	34.94	5.97	5.56		186.20
2042	562.49	35.37	6.02	5.61		186.20
2043	562.54	35.82	6.07	5.67		186.20
2044	562.59	36.26	6.13	5.72		186.20
2045	562.64	36.72	6.18	5.78		186.20
2046	562.69	37.18	6.24	5.83		186.20
2047	562.73	37.64	6.29	5.89		186.20
2048	562.78	38.11	6.35	5.94		186.20
2049	562.83	38.59	6.40	6.00		186.20
2050	562.88	39.07	6.46	6.06		186.20
Levelized (2018-2026)	561.09	24.50	4.59	4.18		186.20
Levelized (2018-2032)	561.39	26.27	4.89	4.48		186.20
Levelized (2018-2047)	561.84	29.96	5.35	4.94		186.20

Avoided Cost Of Petroleum Fuels by Sector and Other Fuels - Effective January 1, 2021

	Fuel Oils							Other Fuels				
	Residential	Commercial			Industrial			Residential				Industrial
Year	Distillate Fuel Oil	Distillate Fuel Oil	Residual Fuel Oil	Weighted Average	Distillate Fuel Oil	Residual Fuel Oil	Weighted Average	Cord Wood	Pellets	Kerosene	Propane	Kerosene
	$/MMBtu 2018$	$/MMBtu 2018$	$/MMBtu 2018$	$/MMBtu 2018$	$/MMBtu 2018$	$/MMBtu 2018$	$/MMBtu 2018$	$/MMBtu 2018$	$/MMBtu 2018$	$/MMBtu 2018$	$/MMBtu 2018$	$/MMBtu 2018$
2018	17.30	14.16	10.69	14.04	14.44	10.93	14.16	10.46	16.86	15.52	26.98	14.63
2019	16.26	13.36	10.63	13.27	13.66	10.97	13.44	9.83	15.85	14.58	24.12	13.84
2020	17.71	14.59	12.09	14.51	14.95	12.57	14.76	10.71	17.26	15.88	25.62	15.15
2021	19.37	15.96	13.62	15.88	16.37	14.24	16.20	11.72	18.88	17.37	27.57	16.59
2022	20.95	17.38	15.05	17.30	17.87	15.83	17.71	12.67	20.41	18.78	30.08	18.11
2023	22.91	19.03	16.74	18.95	19.58	17.61	19.42	13.85	22.33	20.54	32.86	19.84
2024	23.23	19.30	17.13	19.22	19.86	18.02	19.72	14.05	22.64	20.83	33.01	20.13
2025	23.71	19.79	17.70	19.72	20.40	18.61	20.26	14.34	23.11	21.26	32.94	20.68
2026	24.08	20.11	18.16	20.05	20.74	19.10	20.61	14.56	23.47	21.59	33.00	21.02
2027	24.28	20.33	18.34	20.27	20.98	19.29	20.85	14.68	23.66	21.77	33.31	21.26
2028	24.32	20.39	18.42	20.33	21.05	19.37	20.92	14.71	23.70	21.81	33.40	21.33
2029	24.54	20.63	18.77	20.57	21.31	19.74	21.19	14.84	23.91	22.00	33.44	21.60
2030	25.00	21.05	19.23	20.99	21.76	20.22	21.64	15.12	24.36	22.42	33.70	22.05
2031	25.41	21.40	19.69	21.34	22.13	20.71	22.02	15.37	24.76	22.78	34.37	22.43
2032	25.90	21.81	20.20	21.76	22.56	21.25	22.46	15.66	25.25	23.23	34.87	22.86
2033	25.82	21.80	20.18	21.74	22.56	21.23	22.45	15.61	25.16	23.15	34.97	22.86
2034	26.13	22.07	20.55	22.02	22.84	21.62	22.75	15.80	25.47	23.43	35.34	23.15
2035	26.35	22.24	20.74	22.19	23.02	21.82	22.92	15.93	25.68	23.63	35.51	23.33
2036	26.88	22.69	21.34	22.65	23.50	22.44	23.41	16.25	26.19	24.10	36.04	23.81
2037	26.95	22.74	21.45	22.69	23.54	22.56	23.46	16.30	26.27	24.17	36.28	23.86
2038	27.12	22.84	21.59	22.80	23.64	22.71	23.57	16.40	26.43	24.32	36.76	23.96
2039	27.49	23.14	21.88	23.10	23.96	23.01	23.88	16.62	26.79	24.65	37.45	24.28
2040	27.69	23.27	22.12	23.23	24.09	23.26	24.02	16.74	26.99	24.83	37.70	24.41
2041	27.73	23.32	22.36	23.29	24.14	23.52	24.09	16.77	27.03	24.87	38.12	24.46
2042	27.79	23.30	22.30	23.27	24.11	23.46	24.05	16.80	27.08	24.92	38.33	24.43
2043	27.85	23.31	22.36	23.28	24.11	23.52	24.07	16.84	27.14	24.97	38.65	24.44
2044	27.95	23.36	22.47	23.33	24.16	23.63	24.11	16.90	27.23	25.06	38.91	24.48
2045	28.04	23.45	22.60	23.43	24.26	23.77	24.22	16.95	27.32	25.14	39.04	24.59
2046	28.21	23.61	22.80	23.59	24.43	23.99	24.40	17.06	27.49	25.29	39.33	24.76
2047	28.55	23.91	23.10	23.88	24.75	24.30	24.71	17.27	27.83	25.60	39.65	25.08
2048	28.57	23.93	23.15	23.90	24.76	24.35	24.73	17.28	27.85	25.62	40.01	25.10
2049	28.76	24.10	23.37	24.08	24.95	24.58	24.92	17.39	28.03	25.79	40.20	25.29
2050	29.04	24.34	23.66	24.32	25.20	24.89	25.18	17.56	28.30	26.04	40.55	25.54
Levelized Costs												
2018-2026	20.87	17.31	14.91	17.23	17.79	15.60	17.61	12.62	20.34	18.72	29.83	18.03
2018-2032	22.17	18.47	16.26	18.40	19.02	17.05	18.86	13.40	21.60	19.88	31.11	19.28
2018-2047	24.49	20.50	18.76	20.44	21.16	19.70	21.04	14.81	23.86	21.96	33.94	21.45

Environmental Externality Adjustments - Effective January 1, 2021

Year	Natural Gas				Fuel Oil		
	Residential CO_2 $/MMBtu (2018$)	Commercial CO_2 $/MMBtu (2018$)	Industrial CO_2 $/MMBtu (2018$)		Residential CO_2 $/MMBtu (2018$)	Commercial CO_2 $/MMBtu (2018$)	Industrial CO_2 $/MMBtu (2018$)
2018	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2019	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2020	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2021	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2022	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2023	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2024	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2025	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2026	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2027	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2028	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2029	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2030	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2031	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
2032	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
Levelized Costs							
5 years (2018-2022)	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
10 years (2018-2027)	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05
15 years (2018-2032)	$5.85	$5.85	$5.85		$8.05	$8.05	$8.05

Annual Avoided T&D Costs - Effective January 1, 2021

Year	**BED** (for custom measures) $/kW (2018$)	**Efficiency Vermont** (for use by Efficiency Vermont for all measures and BED for prescripive measures) $/kW (2018$)
2019	45	94
2020	45	94
2021	45	94
2022	45	94
2023	45	94
2024	45	94
2025	45	94
2026	45	94
2027	45	94
2028	45	94
2029	45	94
2030	45	94
2031	45	94
2032	45	94
2033	45	94
2034	45	94
2035	45	94
2036	45	94
2037	45	94
2038	45	94
2039	45	94
2040	45	94

Distribution Line Loss Values - Effective January 1, 2021

Distribution Line Loss Values - Efficiency Vermont		
Marginal Losses by Costing Period		
	*not including PTF**	*including PTF*
Winter Peak	11.8%	14.8%
Winter Off-Peak	9.8%	12.3%
Summer Peak	11.9%	15.0%
Summer Off-Peak	9.5%	11.9%
Average Losses at Peak Hour		
	not including PTF	*including PTF*
Winter	9.0%	11.3%
Summer	8.9%	11.2%

Distribution Line Loss Values - BED		
Marginal Losses by Costing Period		
	not including PTF	*including PTF*
Winter Peak	3.8%	6.4%
Winter Off-Peak	3.0%	5.1%
Summer Peak	4.3%	7.3%
Summer Off-Peak	3.4%	5.7%
Average Losses at Peak Hour		
	not including PTF	*including PTF*
Winter	3.0%	5.0%
Summer	3.2%	5.3%

* PTF means pooled transmission facility

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